

- 35 -

What is claimed is:

1. A method of producing a transgenic turfgrass plant, comprising the steps of:

5 a) providing regenerable callus tissue from the turfgrass plant;

b) inoculating the tissue with *Agrobacterium* carrying at least one vector for transformation, the vector comprising virulence genes  
10 that confer strong infectivity to *Agrobacterium*, in which vector is inserted a heterologous DNA construct operably linked to a promoter from a monocotyledonous species, and a selectable marker gene conferring antibiotic resistance to transformed cells operably linked to a promoter from a  
15 monocotyledonous species;

c) culturing the inoculated tissue under conditions that enable the *Agrobacterium* vector to transform cells of the tissue;

d) selectively culturing the inoculated  
20 tissue on a selection medium comprising the antibiotic; and

e) regenerating a transformed turfgrass plant from the selectively cultured tissue.

25 2. The method of claim 1, wherein the turfgrass is a species selected from the group consisting of creeping bentgrass, tall fescue, velvet bentgrass, perennial ryegrass, hard fescue, Chewings fescue, strong creeping fescue, colonial bentgrass and Kentucky  
30 bluegrass.

3. The method of claim 1, wherein the *Agrobacterium* comprises a binary vector system and the virulence genes therein are obtained from a plasmid  
35 within *Agrobacterium tumefaciens* strain 281.

- 36 -

4. The method of claim 3, wherein the binary vector system comprises plasmid pSB111SH.

5. The method of claim 1, wherein the promoter is selected from the group consisting of maize ubiquitin gene promoters, rice actin gene promoters, maize *Adh 1* gene promoters, rice or maize tubulin (*Tub A*, *B* or *C*) gene promoters, and alfalfa *His 3* gene promoters.

6. The method of claim 1, wherein the selectable marker gene confers hygromycin resistance on transformed tissue.

7. The method of claim 1, wherein the callus is obtained by culturing seeds of the turfgrass on a medium that promotes de-differentiation of plant tissue.

8. A transgenic turfgrass plant prepared by the method of claim 1.

9. A seed of the transgenic turfgrass plant of claim 8.

10. The transgenic turfgrass plant of claim 8, which comprises a transgene selected from the group consisting of:

- a) a gene encoding glucose oxidase;
- b) a gene encoding citrate synthase;
- c) genes encoding  $\Delta$ -9 desaturase from *Saccharomyces cerevisiae* or *Cryptococcus curvatus*;
- d) a gene encoding  $\Delta$ -11 desaturase;
- e) a gene encoding a plant homolog of the neutrophil NADPH oxidase;
- f) a gene encoding bacteriopsin from *Halobacterium halobium*; and

- 37 -

g) a gene encoding pokeweed antiviral protein.

11. A superbinary vector system for  
5 *Agrobacterium*-mediated transformation of turfgrass, which  
comprises:

a) a virulence region from a Ti plasmid of  
an *A. tumefaciens* strain that confers to the strain as  
strong a virulence as that displayed by *A. tumefaciens*  
10 strain 281;

b) a selectable marker gene operably  
linked to a promoter obtained from a gene of a  
monocotyledenous plant; and

c) a site for insertion of at least one  
15 additional coding sequence, operably linked to a promoter  
obtained from a gene of a monocotyledenous plant, the  
promoter being the same as or different from the promoter  
operably linked to the selectable marker gene.

12. The vector system of claim 11, wherein the  
20 virulence region is obtained from *Agrobacterium* strain 281.

13. The vector system of claim 11, wherein the  
promoter is selected from the group consisting of maize  
25 ubiquitin gene promoters, rice actin gene promoters,  
maize *Adh* 1 gene promoters, rice or maize tubulin (*Tub* A,  
B or C) gene promoters, and alfalfa *His* 3 gene promoters.

14. The vector system of claim 11, wherein the  
30 selectable marker gene confers hygromycin resistance on  
transformed cells.

15. The vector system of claim 11, wherein the  
site for insertion of the additional coding sequence  
35 comprises a coding sequence of a reporter gene.

- 38 -

16. The vector system of claim 15, which comprises plasmid pSB111SH.

17. The vector system of claim 11, wherein the site for insertion of the additional coding sequence comprises a coding sequence of a gene selected from the group consisting of:

- a) a gene encoding glucose oxidase;
- b) a gene encoding citrate synthase;
- c) genes encoding  $\Delta$ -9 desaturase from *Saccharomyces cerevisiae* or *Cryptococcus curvatus*;
- d) a gene encoding  $\Delta$ -11 desaturase;
- e) a gene encoding a plant homolog of the neutrophil NADPH oxidase;
- f) a gene encoding bacteriopsin from *Halobacterium halobium*; and
- g) a gene encoding pokeweed antiviral protein.

18. A turfgrass plant cell transformed with the vector system of claim 11.

19. The turfgrass plant cell of claim 11, wherein the cell is of a turfgrass selected from the group consisting of creeping bentgrass, tall fescue, velvet bentgrass, perennial ryegrass, hard fescue, Chewings fescue, strong creeping fescue, colonial bentgrass and Kentucky bluegrass.

20. A transgenic turfgrass plant regenerated from the transformed cell of claim 18.

21. A seed of the transgenic turfgrass plant of claim 20.